

US Army/Baylor University

Graduate Management Project

A Qualitative Case Study
on the Implementation and Effectiveness of
a Purchase Order Automation System

Submitted to:

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This project presents contemporary thoughts on the merits of the implementation and effectiveness of a new purchase order automation system. This case study reviews the steps taken to implement this system and the lessons learned along the way. Information is presented on the conditions, methods, objectives, and problems associated with this project. Information is also presented on the insights, advantages, and utility gained in the implementation of this automated system.

The completion of the project resulted in the accomplishment of many things, they are loosely grouped into two categories. The first group of benefits centers around the topic of information. This project, which implemented a network-based purchase order tracking system with a database, has dramatically increased the amount of useful information for the organization. This is new and was not possible with the old system.

The second group of benefits centers around control. The old process suffered from a general lack of control and this project, for the most part, has alleviated this problem. This consequent efficiency, and the previously mentioned wealth of information has been the result of the implementation of a purchase order tracking system this is clearly superior to its predecessor. This has been done to the benefit and satisfaction of the manager, the customers of the process, and to the organization.

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TABLE OF CONTENTS

ABSTRACT.....	iv
THE GRADUATE MANAGEMENT PROJECT	1
INTRODUCTION	2
Conditions Which Prompted the Study	2
Statement of the Problem and Question.....	3
Objectives of the Study	4
Literature Review.....	4
METHODS AND PROCEDURES.....	6
Who was Involved in the Study?	6
How was the Study Completed?	7
The Case Study Method.....	7
A Critical Instance	8
Qualitative Descriptions.....	9
The Qualitative Evaluation	9
Measuring the Effectiveness	10
Open Ended Interview Questions	11
What About Validity and Reliability?	12
DISCUSSIONS.....	14
Organizational and Project Background	14
From my Perspective	15
Project Management	15
The First Objective - Analyze and learn the Plan's Purchase Order System.....	16
The Second Objective - Evaluate and Select a Software Vendor	17
The Third Objective - Coordinate & Resolve Implementation Issues with Vendor....	18
The Fourth Objective - Develop and Implement the Training Plan	20

The Fifth Objective - Develop the New Policies and Procedures.....	22
The Proverbial Can of Worms	22
New Purchase Request Forms	22
Health Plan Signature Authority Cards and Policy.....	24
The Purchasing Policy	26
The Purchasing Department's Procedures	27
 The Sixth Objective - Opinion and Satisfaction of the Old System	 29
 The Seventh Objective - Deployment of the New System	 32
The First Phase.....	32
The Second Phase	32
The Third Phase	33
Advantages of the New System	34
 The Eighth Objective - Evaluate the New System.....	 36
 CONCLUSIONS.....	 39
 REFERENCES	 40

ABSTRACT

This project presents contemporary thoughts on the merits of the implementation and effectiveness of a new Purchase Order automation system. This case study reviews the steps taken to implement this system and the lessons learned along the way. Information is presented on the conditions, methods, objectives, and problems associated with this project. Information is also be presented on the insights, advantages, and utility gained in the implementation of this automated system.

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THE GRADUATE MANAGEMENT PROJECT

A Qualitative Case Study on the Implementation and Effectiveness
of a Purchase Order Automation System

This project will present contemporary thoughts on the merits of the implementation and effectiveness of a new Purchase Order automation system. Information will be presented on the conditions, methods, objectives, and problems associated with this project. Information will further be presented on the insights, advantages, and utility gained in the implementation of this automated system. The great depth of this topic, the amount of information involved in the implementation, and the limited format of this paper, has required the consolidation of the major elements. Therefore, I have divided this paper into four sections as follows: introduction, methods and procedures, discussions, and conclusions.

INTRODUCTION

Conditions Which Prompted the Study

This effort was initiated by the George Washington University Health Plan's Director for Administration. He had, for sometime, been considering automating the Plan's Purchasing Department because he felt there were inadequate management controls and no useful historical information.

I was originally made aware of the director's concerns during my rotation through the Purchasing Department (as part of my training). It was at this time that he asked me to investigate the possibilities of automating the current process. A summary of the operation and introductions to the interested parties were given. Follow-on presentations on the deficiencies of the current system were held and the key issues were identified.

The Director for Administration had two key concerns. The first, and most important, dealt with the lack of useful historical information. The current system was entirely paper driven, relying on 4-part forms, clearly deficient log books, and an unkempt and unreliable filing system. It could best be described as no system at all. Tools that lend themselves to this type of process and that are considered common (Personal computers (PC), printers, and databases), were not being utilized. The system that was in place was barely adequate for the day-to-day operations, let alone the detailed retrospective analysis that was desired.

Second, there was a general lack of control. There was no written policy, no documented processes, and no defined responsibilities. The whole operation was run by

a "rule of thumb," and "that's the way we've always done it" mentality. This type of environment, as you could imagine, created many problems (identical recurring mistakes, lost purchase orders, and extremely untimely delays). This combined with the external constraints of the plan (centralized signature approval, and no detailed departmental budgets) created an inefficient, unstructured, and frustrating process that was unquestionably in need for a change. It was the combination of this need for change, the desire for more information, and the request of the Director of Administration that prompted this study.

Statement of the Problem and Question

The George Washington University Health Plan's manual purchase order tracking system was ineffective, inefficient, and in a constant state of discrepancy. The research question that was examined is: "What would be required to automate the Purchase Order process to improve its functionality, proficiency, and customer service?"

Objectives of the Study

The purpose of this study was to describe the process of implementing a Purchase Order automation system and to evaluate the success of this implementation. The many objectives that were associated with this project are listed as follows:

- Analyze and learn the Plan's Purchase Order System
- Evaluate and select a software vendor
- Coordinate and resolve all implementation issues with vendor
- Develop and implement a training plan
- Develop new policy and procedures for Purchase Order System
- Determine the opinion and satisfaction of the current system
- Deploy the new system
- Evaluate implementation of the new system

Literature Review

The unique nature of this specific project eliminated the availability of other analogous cases to build upon. However, it did not eliminate instances of similar ones. There were some that identified, described, and even recommended various approaches that were applicable to this situation and are worth presenting.

The first such case dealt with the implementation and evaluation of a new computer system. In this study, qualitative and quantitative methods were combined in a longitudinal study of interrelationships between perceptions of work and a computer information system (Kaplan 1988). It was based on a study of the introduction of computer technology in a medical laboratory at a university medical center. The problems and contributions stemming from different methodological approaches were examined, and the results suggested merit in investigating specifically how a new

implementation of a computer system may affect users' jobs (Kaplan 1988). Although this implementation was a computer system in the traditional sense, and did not closely resemble the automation effort that I was working on, there was still one relevant aspect. The case study used a qualitative longitudinal evaluation to judge the implementation of the system over time (this case study uses a similar method).

Another fitting case study presented itself as a method of understanding the development and adoption of expert systems applications. This was opportune because it recommended the case study method as an appropriate method for analyzing the implementation of an expert system. Although the information systems and computing sciences literature have historically shown a bias toward quantitative methods of inquiry, this study asserted a preference for the use of the qualitative methods (Eliot 1992). The author believed the case study method would help ground and augment the traditional empirical laboratory-setting examinations (Eliot 1992).

Lastly, the use of a case research strategy in the studies of information systems was examined. Case research strategy, which uses qualitative techniques, is more appropriate than the quantitative techniques that the author cites as having caused dissatisfaction because of their complexity and restrictions (Benbasat 1987). The author then presents three reasons to use case research strategy that are applicable; the researcher can study IS in a natural setting, the researcher can answer the questions that lead to understanding the nature and complexity of the processes taking place, and it is an appropriate way to research a previously little-studied area (Benbasat 1987).

METHODS AND PROCEDURES

Who was Involved in the Study?

Although the transition to the new system affected everyone in the Health Plan, there were only a few persons directly involved with the implementation project. I, of course, had an integral role as both a participant observer and evaluator. This role was difficult and frustrating at times, but it was not without its rewards. When it came to the project, I had the luxury of broad decision discretion, macro-management, and considerable input into the overall process.

I also had the opportunity to work with many people, with mostly pleasurable experiences. The ones directly involved with the implementation were the Director for Administration, the manager for administrative support, the purchasing specialist, the telecommunication specialist, the software vendor, and representatives from the Management Information Systems (MIS), marketing, and finance departments.

As for the people involved with the evaluation of the system, a randomized typical case sample was drawn from a representative pool of volunteers from the health plan. The selection of this representative pool was done with the cooperation of key informants and the purchasing specialist. This was done to demonstrate to those unfamiliar with the process what a typical experience was like, and not for generalizations of the sample (in a critical instance study broad generalization are of little or no value) (Patton 1987).

How was the Study Completed?

The Case Study Method

There were many methods of study that could have helped achieve the goals and objectives of the project. However, based on the limits of the specific situation I believed that there were only a few methods that were a good fit. First, I believed that this situation warranted the attention of a case study. The definition that was found to be most helpful in this determination came from the Government Accounting Office's (GAO) Case Study methodology guide: "A case study is a method for learning about a complex instance, based on a comprehensive understanding of that instance obtained by extensive description and analysis of that instance taken as a whole and in its context (U.S. General Accounting Office 1990)."

There are three portions of the definition that were extremely relevant to the situation and strengthen the argument that this was the best method. First, this study epitomized a complex instance. It was very elaborate and complicated, it had multiple convoluted issues, and it involved many departments and activities. Secondly, the detailed understanding gained over the past eight months, which was based on comprehensive understanding, was obtained by extensive description and analysis. And lastly, since this study involved so many unquantifiable aspects of the health plan, it was best presented holistically, and in context. This project, and the environment that it operated in, lent itself perfectly to the case study method.

A Critical Instance

The next aspect in the study development process was the determination of the case study type. There are six types of applications for case study methods; illustrative, exploratory, critical instance, implementation, program effects, and cumulative (U.S. General Accounting Office 1990). Each method has particular strengths, weaknesses, advantages, and disadvantages for various situations (with each situation having some design decisions that are more relevant than others). Taking the pertinent information into account, and after careful examination of the design decisions of each method, the literature suggested that the critical instance application method was the most appropriate (U.S. General Accounting Office 1990). The following table (Table-1) summarizes the differences between the varying methods and illustrates this choice.

Design Decision	Illustrative, Exploratory	Critical Instance	Implementation, Program Effects, Cumulative
<i>Basis for site selection</i>	Typical, representative, cluster	<i>Convenience, unique interest</i>	Best-worst case, bracketing, typical, representative, cluster, probability
<i>If multi-method</i>	Concurrent	<i>Concurrent</i>	Before, concurrent, after
<i>Pre-structuring</i>	Low, moderate	<i>Low, moderate</i>	Moderate, high
<i>Types of Data</i>	Qualitative only, qualitative and quantitative	<i>Qualitative only, qualitative and quantitative</i>	Qualitative only, qualitative and quantitative
<i>Sequence of analysis</i>	Within sites	<i>Within sites</i>	Within sites, then across sites
<i>Reporting</i>	Narrative	<i>Narrative</i>	Thematic

Table-1

A key point of the critical instance case study application that was particularly relevant is succinctly presented in the following quotation.

“The critical instance case study examines one, or very few, sites for one of two purposes (for our situation, only the first purpose is relevant). First, a very frequent application is the examination of a situation of unique interest, such as the Three Mile Island, or the Challenger disaster. There is little or no interest in generalizability. The instance is not “selected” by us; rather, we are called to it (U.S. General Accounting Office 1990).”

Which was exactly what had occurred in this instance.

Qualitative Descriptions

This case study needs to describe, in great detail, two aspects of the process. The first was the implementation of the automated system. This was done in depth, in detail, in context, and holistically (Patton 1987). This lent itself to the qualitative method with direct observations and “thick” descriptions, which emphasized the importance of getting close to the people and the situations being studied in order to understand personally the realities and minutiae of the project lifecycle (U.S. General Accounting Office 1990).

Since there were no quantifiable aspects to this part of the process, and this study aims at individualized outcomes, the qualitative case method was even more appropriate (Patton 1987). The second aspect of the process, which dealt with the evaluation of the implementation, is presented in detail in the next section.

The Qualitative Evaluation

The only truly appropriate method for the evaluation of this system implementation was the qualitative method. It accommodated this study’s need for flexibility and captured the essence of the experience. But since this study could have been done either

quantitatively or qualitatively, and since each has advantages and disadvantages, information will be presented to explain this decision.

First, a major tenet of quantitative analysis is its stringent methods and structures for data collection. A hypothesis is first framed, then data is collected to either support or refute the claim (King 1987). This would not have been appropriate for this situation. The project was started with no preconceived notions, there was no hypothesis to test. The first four months were spent learning the process and only after that were we in the position to develop the evaluation. This situation and the type of approach suggested the qualitative evaluation and reinforces said argument.

The next point, which also bolstered the appropriateness of a qualitative evaluation, lied in the fact that there was no written plan or set of defined tasks (King 1987). Since trying to retrospectively construct one from historical information was impossible, the only method still justifiable was the qualitative method of observation (King 1987). Lastly, as the literature review illustrated, this was a unique case. Since there were no common features, it demanded qualitative inquiry to catch the true flavor of the program, and to discover the particular set of elements that made it work (Van Maanen 1983).

Measuring the Effectiveness

Using a qualitative evaluation to measure the effectiveness of the implementation presented many interesting choices in the evaluation instrument design. After careful research the following evaluation design was utilized: A qualitative analysis with the combination of open-ended interviews of a randomized typical case sample of people in

different status positions, and direct participant observations (because this design satisfies two of the four basic tenets of Denzin's theory on data collection it adequately compensates for any problems of rival causal factors) (Patton 1987). Now for the questionnaire itself.

Open Ended Interview Questions

The standardized open-ended interview consisted of a set of questions carefully worded and arranged for the purpose of taking each respondent throughout the same sequence and asking each respondent the questions with essentially the same words (Patton 1987). This method, which was very appropriate for the situation, is traditionally used when there is limited time for the interview, the evaluation is gathering opinion before and after an event, and it is important to minimize the variation in the questions posed to the interviewees (Patton 1987).

With this method in mind, there are basically six kinds of questions that can be asked of people (Patton 1987). For the purposes of the evaluation, only the three types that were relevant to the situation were used in the creation of the questionnaire.

Knowledge questions are aimed at finding what factual information the respondent has. The assumption here is that certain things are considered to be known. These things are not opinions, they are not feelings, but rather they are things that one knows. They are the facts of the case (Patton 1987).

Opinion/Belief questions are aimed at understanding the cognitive and interpretive processes of people. Answers to these questions tell us what people think about the experience, or about a specific process (Patton 1987).

Background/Demographic questions concern the identifying characteristics of the person being interviewed. They are distinguishable from the knowledge questions primarily by their routine nature (Patton 1987).

With the above fore mentioned concepts in mind, a standardized open-ended interview questionnaire was created. It included questions that represented each of the question types identified in the previous section (these questions were created using well-established guidelines for content, format and order) (Patton 1987). It, as well as a background and guideline sheet is attached as Appendix-A for your convenience.

What About Validity and Reliability?

Case study methods can use two tactics for achieving measurement validity: multiple sources of evidence and using the chain-of-evidence technique in data reduction. Because the first technique lends itself to my study, I will be using multiple data sources exclusively. This method will require "thick" description in order to get enough information to check for trends, to rule out competing explanations, and to corroborate findings (U.S. General Accounting Office 1990). Eight techniques can be used to collect information, but for the purposes of this study, I will be concentrating on two of the methods (open-ended interviews and direct observations) (Yin 1994) (U.S. General Accounting Office 1990).

As for reliability, the extent to which a measuring procedure can produce the same results on repeated trials, there are two relevant points for the content analysis portion of this study (U.S. General Accounting Office 1989). First, since many of the problems associated with content analysis are due to inter-rater reliability, and this study employed only one rater, this aspect of rater reliability is not applicable (U.S. General Accounting

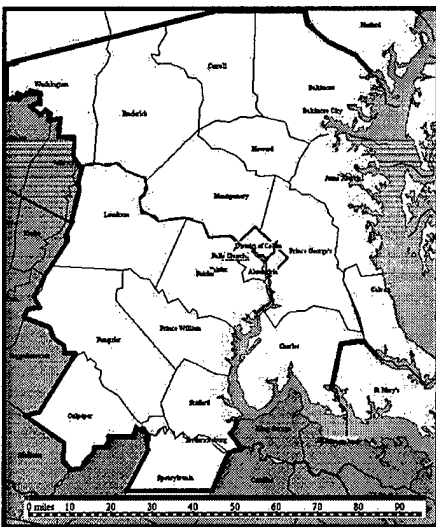
Office 1989). Secondly, pretesting of the coded categories resulted in an 97 percent agreement factor. This factor, which can be used as a gauge for the reliability of content analysis, is well above acceptable levels (80-90) and speaks highly of the coded categories and the rating reliability (U.S. General Accounting Office 1989). These two points combined provide reasonable assurances for reliability and create sufficient conditions for the validity of the study.

DISCUSSIONS

Organizational and Project Background

This portion of the paper will revolve around the objectives identified earlier.

This will be the basis of the project. But before proceeding, a little background is



warranted. The health plan, as it exists today, is a mixed model HMO (network and group) that operates in the Washington metropolitan area (over 18 counties and the city of Baltimore). It has over 90,000 members and is affiliated with over forty hospitals. It provides care through almost 3,500 credentialed physicians at six satellite clinics, single and multi-specialty group offices, and private practices. It is

currently NCQA accredited and consistently ranks high in regional satisfaction surveys.

The last few years have been rocky for the organization. The marketplace has become very competitive and the organization has not fared well. It has been unprofitable for the last two plus years and the University (the parent company if you will) has been reevaluating the desirability of ownership/management of this organization. The looming possibility of acquisition or merger has filled the organization with feelings of apprehension and uncertainty. For many employees, this is not a desirable place to work (exemplified by the constant employee retention problems).

From my Perspective

When I arrived at the health plan I had certain perceptions (more appropriately misconceptions) about what it would be like to work in this civilian organization. Based on brief conversations and the introductory tour there was an expectation of a state-of-the-art facility (both in operation, and resources). In some respects this was the case, in others, this was sorely mistaken. There were, and still are, many aspects of the organization that are clearly deficient. The state of the health care environment in general, and the local marketplace have surely caused many of the current problems and crisis's. But they are not the only attributable causes. Over the last twenty-five years it appears that the organization has outgrown its expertise (past poor decisions, antiquated processes, and lack of capital improvements) and has found itself in the position of being uncompetitive. With this background information in mind, the next, and remaining sub-sections will be devoted to the project itself.

Project Management

To complete the automation project, five main tasks were broken into multiple sub-projects. Appendix-B show the various tasks, sub-projects, duration, and completion status of the objectives of the project (Gantt chart). This chart, which was a living document, was constantly being revised during the project lifecycle to reflect and adjust for the many deliverable slips. The tasks and sub-projects identified loosely follow the objectives presented earlier and are the outline for the next sections.

The First Objective - Analyze and learn the Plan's Purchase Order System

This objective was difficult and time consuming. Not only because of the intricacies of the objective itself, but also because it was my first experience with the people involved. Initially, time was spent in briefings surveying background papers and information on the plan's purchasing process. Considerable time was also spent observing the processes in action and walking through the process step by step. Meetings were held on numerous occasions and rudimentary documents were created. This constituted the preliminary learning phase of the project. This was done to determine the feasibility of the project. At the conclusion of this phase, the decision was made to continue with the project. The consensus was that the implementation of the project would result in noticeable increases in purchasing functionality and productivity.

Continuing with the learning phase of the project, we next identified the stakeholders and goals of the project (this was done through a chain of event's technique and direct observations). Significant time was spent with the major stakeholders in an effort to ensure buy-in. We were determined to identify and institute adequate "special" procedures to account for the numerous special circumstances that invariably would occur. Although the draft-review-revision cycles were lengthy and frustrating, in the end, they became worthwhile, because buy-in was achieved from all parties.

For the process itself, the actual step-by-step procedures of purchasing. There was, as stated earlier, no documentation, no policy, or procedures in place. Everything was done by a "rule of thumb," and "that's the way we've always done it" mentality. This type of "system" by its very nature, is unreliable and inconsistent. The ironic aspect of this situation was that, in concept, it could have easily been corrected. The actions and outcomes in this process were predictable. Since there was predictability in the process, the actions and outcomes could be linked together to create a map of the entire process. This was done and is enclosed as Appendix-C (refinement of these "process maps" continued throughout the project). These maps, which were well received and accepted, were the basis of the policies and procedures that were later developed.

This first objective, learning the plan's purchase order system, resulted in the identification of the stakeholders of the process and the creation of the goals of the project and process maps. The combination of this information and understanding became the foundation for the project. The rest of the objectives were built upon the information presented in this section.

The Second Objective - Evaluate and Select a Software Vendor

This started with an investigation of the feasibility and cost/benefit of purchase order software. After contacting various vendors and peers at other organizations, to determine costs and solicit recommendations for purchase order tracking software, we learned that many like organizations either had no software application in place, or had a

“home grown” proprietary application. After an extensive search we were able to identify three vendors that offered possible solutions. Fact sheets from the vendors about the three software products are included in Appendix-D.

Demonstrations of the software product were coordinated and demo-versions of the packages were obtained. Working with the vendors, learning the software, and identifying the strengths and weakness of the products was cut and dry. At the time of the decision, and after careful evaluation, there was only one product that had the capabilities that we were looking for. The decision was made to choose this product, it was called the SMARRT system (Supply Management Automated Reporting Replenishment and Tracking produced by BT Office Products International).

The Third Objective - Coordinate & Resolve Implementation Issues with Vendor

Getting the software product installed and running was the next course of action. This involved conversations and meetings with the vendor’s support staff and the health plan’s MIS department. Time tables and system change requests were created, and after the initial preparation, the application was installed and up and running in less than a week. This was important because SMARRT application training was a lengthy part of the project and could not be started until this step was completed.

The next requirement was the submission of the health plan’s accounting cost centers to the vendor for incorporation into the final database. This information needed to be provided and approved by the finance directorate. In concept, this task was simple,

but since the finance directorate was undergoing sweeping changes, it proved extremely difficult. Until October 1996, the organization looked at the annual budgeting process from the macro perspective. Often not budgeting down to the department level for many account types. But after the reorganization of March 1996 (a reorganization in which the COO, CFO, and Medical Director were removed), the new front office looked at issues from a different perspective. One of these issues was the annual budget process.

In October 1996, the (new) CFO introduced and explained to the health plan the new annual budget process. This process utilized zero-based budgeting and a detailed departmental allocation matrix. This was not well received (even though it was clearly appropriate given the situation) and a new and difficult process for some managers to comply with. It was at this time that we were trying to provide the cost center information to the vendor for the database incorporation. Needless to say, we were not finance's highest priority. The original hopes of deploying the new purchasing system on the first of January 1997 were quickly dashed when finance could not arrive at a consensus concerning the internal cost centers and the external satellites. This condition dragged on until the beginning of December 1996 before it was finally resolved (final cost centers are included as Appendix-E1). This resulted in the first major delay of the project, the deployment schedules slipped by more than a month.

The last issue to be addressed for this objective concerned the management of the SMARRT system. From a system administration perspective, there were a number of issues that needed to be resolved and addressed. These issues involved working with the

vendor identifying and resolving all application management issues (back-up, filters, log-on procedures, users database, and upgrade cycles. The identification and resolution of these issues went well and did not present any problems to the long-term viability of the project (some of this documentation is included as Appendix-E2).

The Fourth Objective - Develop and Implement the Training Plan

Shortly after the SMARRT system was installed we began application training. This training took longer than expected, but considering the issues involved, went reasonably well. The users of the system had no practical experience on a computer let alone using a Windows based tracking system. Even though this was known prior to the start of the training, its significance was not realized until the second week of training.

During the second week, we realized the training timelines were too aggressive and needed to be adjusted. The users of the system could not adequately retain the application information and were having difficulty comprehending some of the concepts.

The training plan was extended considerably. The original plan called for three months of training, this was extended to seven months. This had an impact on the deployment of the project, but it was not as dramatic as one would think. By adjusting the order of the topics covered, and concentrating on the "operational" subjects first, we were able to create a "survival list" of concepts. This list addressed the concepts and subjects that were most important to the immediate operation of the system. By training on these

subjects first, we were able to deploy the system only a month later than expected. This was the second major slip for the project (the first one being the cost center predicament).

The actual training sessions consisted of one hour, one-on-one sessions, up to three times a week. These sessions were held in the users' workspace, on the users' computer, working around the users' schedule. This was done to minimize the disruption and increase the level of comfort associated with these sessions. The users' were given clearly defined objectives for the session and short exercises that were targeted at retention and conceptual comprehension. The training plan was broken down into four main subjects; Windows survival skills, working with purchase orders, working with inquiries and reports, and maintaining the databases. The first two subjects were considered critical to the operation of the system and were addressed first (as part of the "survival list" presented earlier). The other two subjects were addressed later and did not impact on the day-to-day operation of the application.

The individual session training plan's were created prospectively and adjusted and refined concurrently. Every session had a "draft" lesson plan that was used to guide the session. But as each session progressed, the lesson plan was adjusted to reflect the personal habits and mannerisms of the users. These adjustments were included into the revised lesson plans and returned to the users for comment and possible modification. This resulted in a customized training manual that was used for and created during the training sessions (included as Enclosure 1). This substantial effort produced a manual that was both complete and user-friendly. This site-specific training manual

supplemented the site-generic user manual provide by the vendor. The combination of these two manuals provided excellent coverage, content, and examples of the information needed for the proper operation of the application.

The Fifth Objective - Develop the New Policies and Procedures

The Proverbial Can of Worms

At the beginning of this project, the intent of this objective was narrow and succinct; the creation and implementation of a purchase order policy for the organization and internal purchase order procedures for the department. Unfortunately, this hoped for simplicity would not be the case, because this objective quickly became more involved and complicated. This revealed itself in many ways, but the main difficulty was one of annoying diversions. Before we could address the primary tasks, we learned that there were other related health plan issues that were deficient or had never been addressed. This put us in the position of having to accomplish many secondary tasks that were not included, or even addressed in the preliminary project discussions. What follows are the chain of events that outline the steps taken and the deliverables created as we worked our way towards completion of the primary tasks.

New Purchase Request Forms

The old process for requesting goods or services was done with the use of the health plan purchase orders (PO) (included as Appendix-F1). These forms needed to be filled out and “approved”, submitted to the purchasing department for assignment of a

sequential PO number, and then faxed to a vendor. These presequenced purchase order forms were lying around in every nook and cranny of the organization. They (the forms that were lying around) were the exact same forms that were faxed to the vendors. All that was needed was a PO number and a signature (any signature).

From a fiscal, administrative and management perspective, there was a level of discomfort with this type of control mechanism for the process (or should we say lack of). There was very little that could prevent the unauthorized use of these forms for improper obligations to the organization. Worst case scenario, it was feared that this lack of control would create an opportunity for embezzlement, best case, it was known that this process facilitated rampant abuse of unapproved authorized purchases. In either case, it was not the proper way to manage the operation.

It became necessary to redesign the process a little. One of our first tasks was the creation of new Purchase Request Forms (PRF) (included as Appendix-F2). These electronic forms were designed to replace the purchase orders that were currently being used. They would be widely distributed for use within the organization, and could be completed and printed electronically. The use of these new, more functional and comprehensive forms would effectively remove the purchase order form from the hand of the health plan employee and increase the effectiveness of the process. New purchase orders (included as Appendix-F3) would now only be able to be created on the SMARRT system (access to this system is restricted) thus effectively eliminating the risk associated with unlimited access to purchase order forms.

The next task to be completed was the introduction of the new forms and destruction of the old forms. This was done over time to minimize any possible disruption to the employees of the health plan. Instructions, definitions, and samples to be used in conjunction with the new forms were created (included as Appendix-F4) and distributed throughout the organization by way of memos, the weekly newsletter, and Email. On March 3, 1997 the organization began using the new forms and due, in main part to the effective preparation, the transition went very well (the forms have been in use since the introduction with no associated problems). The acceptance and use of these new forms was a major accomplishment. But it was only one part of this objective.

Health Plan Signature Authority Cards and Policy

The next aspect of the purchasing department's new procedures that was considered integral was the prospective approval of all health plan purchases. In the past this was mostly done retrospectively, and sometimes not at all. This was inappropriate and in need of a change. To resolve this matter we wrote into the purchasing department procedures the requirement to validate the purchase requests as they were submitted. Guidelines for this review process were created and were well received.

There were only a few items on the purchase request that need to be validated. One such item was the signature block (for proper authorization for the purchase). This would traditionally be accomplished through a visual signature comparison check that would commonly be done by comparing the signature on the request with the signature on the accounting signature cards. To my dismay, when I inquired about the signature

cards, I was informed that "we used to use them, but we haven't for the last couple of years". The accounts payable department "recognized" most of the signatures from memory and called the requester if there was a "problem." This was all done retrospectively, after the health plan had already been billed for the purchase.

Again, this was inappropriate and inadequate. With the health plan's permission, we reintroduced a revised signature card to the managers with signature authority (included as Appendix-F5). There was some confusion at first, because no one really knew which managers had authority for what amounts. After conversations with the CEO and the CFO we were able to straighten this out and complete this process (signature authority list included as Appendix-F6). During the completion of this process we learned about the next issue that needed to be resolved. Many of the managers who now had signature authority, did not know what that meant. There was no organizational policy that detailed and explained the signature authority process. This was our next task.

After reviewing the old (very old) documentation, and consulting with the CEO, CFO, Director for Administration, and the University, we were able to create and implement the new signature authority policy. This policy delineated the differences between capital and non-capital items as well as defining the different levels of authorization (included as Appendix-F7). This policy was sorely needed and was well received. With the signature authority cards and new policy in place we were now in a position to address the primary issue.

The Purchasing Policy

This policy, which was part of the primary goal of this objective, was also the most lengthy to completion. The approval process for this policy seemed to drag on endlessly. This was due to circumstances more than anything else, because it was during this time that another wave of transitions surged through the organization. As mentioned earlier, employee retention in the organization had become a significant issue. We were losing a handful of highly skilled employees each month with little hope or success in replacing them. For this project alone, this period saw a quite a few changes. The Director of Administration left the health plan, quickly followed by his two successors. This period of transition did not help the productivity or efficiency of this project. Each new manager required the explanation and re-explanation of the same topics and each wanted to ensure that their perspectives were adequately represented. Although this was understandable, it was also time-consuming and somewhat unproductive.

After countless reviews and revisions the policy was finally approved and distributed. The final policy that went out was significantly different from the original (included as Appendix-F8). Although it was still mainly based on the "process maps", it had been dramatically reduced in size and was greatly simplified. This was done at the request of the Executive Management Team in an effort to ease its introduction to the organization. Introduction of the policy to the organization's managers was the next task to be completed. This was done to facilitate buy-in and answer any questions they might have had. Announcements for the overview sessions were made through the normal

channels and the kick-off presentations were held over a two week period (included as Appendix-F9). These presentations went well and resulted in greater acceptance and compliance with the new policy.

The Purchasing Department's Procedures

The last task to be completed as part of this objective was the internal procedures for the purchasing department. This task was simple in concept, but was and still is difficult in practice. Since the department has a reputation for being unreliable, the task that was addressed centered around three issues; customer service, accountability and creditability (chosen because of insights gained during the evaluation of the old system). These tasks were completed with the participation and active involvement of the Director of Administration and the members of the purchasing department.

There were three procedures implemented that addressed each aspect of our perceived deficiencies. The first put into place was the standardization of operations and the creation of performance goals (Appendix-F10). This, in effect, was our promise to our customers. It was the measuring stick that our customers could use to rate our credibility. The next procedure enacted dealt with the creation of a departmental activity schedule (Appendix-F11). This was developed to create an environment in which the department could become accountable, an environment that would allow the regular performance of certain tasks and duties. The last procedure, which was developed to address our problems with customer service, identified the need to provide appropriate

customer feedback for problem shipments. A form (Appendix-F12) was created and appropriate procedures were put in place to resolve this problem.

These procedures, we believed, created a suitable response and action plan for the situation. But it was just that, a plan. As with all plans, effectiveness is most often attributed to proper implementation, and this part of the project, unfortunately, was not implemented correctly. The problems that occurred could generally be attributed to the lack of management oversight. As stated earlier, there was a period in which this project had three managers in quick succession. This turnover created an environment in which the members of the purchasing department felt little consequence to non-compliance of policies and procedures (although these changes were not outwardly resisted, they were not embraced either).

When it came time to change, the rule of thumb appeared to be "whatever is easier". This resulted in the implementation of some policies and not others. This situation was repeatedly discussed with the managers of the operation and was met with understanding and agreement. On numerous occasions it was to have been addressed, with the persons involved, but to-date, it has not and things have remained the same. The department continues to have difficulties with its levels of customer service, accountability and creditability. Although this portion of the implementation did not work as desired, it is expected that over time, and with the active involvement of the direct manager, this situation can be resolved.

The Sixth Objective - Opinion and Satisfaction of the Old System

To determine the opinion and satisfaction of the old system, open ended interviews were conducted and the responses were studied with a technique called content analysis. Content analysis, which can be used for examining trends over time, was used because of its ability to handle information that is difficult to combine and analyze (U.S. General Accounting Office 1989). This type of analysis is generally defined as a set of procedures for collecting and organizing information in a standard format that allows analysts to make inferences about the characteristics and meaning of written and other recorded material (U.S. General Accounting Office 1989). This procedure was the best and most flexible means of determining the opinion and satisfaction of the old system. To explain its application, the following background information is presented.

There are five steps for the valid utilization of content analysis that must be employed; 1) determine what material should be included, 2) select units of analysis, 3) develop coding categories, 4) code the material, 5) analyze and interpret the results (U.S. General Accounting Office 1989). Each step will be addressed in turn and its relevant issues will be presented. For step one, the relevant issue is sampling. For some applications sampling of the material should be used when the material to be analyzed is too extensive. For this application however, sampling was not used because the material to be analyzed was manageable. For step two, the designation of the units of analysis is

the important issue. For this study, the context unit will be the open ended interview, and the recording unit will be the groups of words that embody the discussion of the issues.

For step three, the coding of the categories is the pertinent issue, because it provides the structure for grouping the recording units (U.S. General Accounting Office 1989). There are three standard requirements that the categories must meet; they should be exhaustive, they should be mutually exclusive, and they should be independent. Categories can be used to measure three qualification levels; space, frequency, and intensity (U.S. General Accounting Office 1989). For this study, we were interested in the quantification of frequency, which can be coded by tallying the number of times each issue or statement occurs in the material (U.S. General Accounting Office 1989). Directly tied to this are two assumptions that are important to incorporate when constructing frequency measures. "First, the frequency with which a statement occurs is a valid indication of value or importance. Second, all content units can be given equal weight and therefore each one can be compared directly with every other (U.S. General Accounting Office 1989)."

For step four, the relevant issue is coding. Material can be coded either manually or by computer, depending on the resources available and the format of the material (U.S. General Accounting Office 1989). For this study the material was coded manually. For the last step, step five, the main issue is analyzing and interpreting the results. This can be done many ways, none of which are unique to content analysis. For this study however, the coded data was summarized in an effort to discover opinion and patterns.

Now for the results, Appendix-G presents, in a simple format, a coding and tally sheet that measured the number of times an issue was addressed during the pre-implementation interviews. This sheet is organized by question and color coded. The questions (discussed earlier in the open ended interview question's section) and the categories are broken down into color coded positive (green) and negative (red) statements. The actual statements given during the interviews were usually different, but they all revolved around only a few select themes. Categories were developed with these "themes" and the statements were re-coded for frequency again.

In general, the pre-implementation opinion of the process was not favorable. There were 38 statements made that would generally be considered unfavorable or negative. This contrasts with the 3 statements that were made that would be considered favorable or positive. The relative frequency of these statements is displayed as a pie chart, with an overwhelming 93 percent negative statement rate. This clearly demonstrates the negative opinion of the pre-implementation purchase order process and provides a comparison point for the post-implementation interview analysis.

The subjects, representing a wide variety of positions and experiences, were fairly consistent in their responses. There did however, appear to be one outlier. This outlier, which made generally positive statements about the pre-implementation process, was in stark contrast to the other subjects. This subject occupies a position in the organization that represents an influential person and anecdotal evidence suggests favoritism for this position has resulted in atypical experiences for this subject.

The Seventh Objective - Deployment of the New System

This project used a phased proto-type implementation with deployment of the phases occurring over the four months of February through May 1997. This type of implementation allowed for maximum flexibility and concurrent feedback. There were three phases of the deployment; database tracking, implementation of new forms and associated policy, and implementation of the new purchasing policy and procedures.

The First Phase

The first phase, which started in the second week of February 1997, consisted of mainly internal purchasing activities that were transparent to the rest of the organization. It started with portions of the old process and combined them with portions of the new process. It used the old forms and policies but took that information and entered it into the new SMARRT database which created the new purchase orders. This gave the purchasing department more time to become familiar with the operation of the system and the creation of purchase orders (a sort of practice phase). This phase lasted about three weeks and was instrumental in instilling confidence in the users' of the system.

The Second Phase

The next phase of the deployment was the institution of the new request forms and associated policy. This began in March and lasted the entire month. During this time the purchasing department accepted both types of forms. However, when old forms were received for processing we took the opportunity to meet with the originator of the request.

This was done so that we could introduce, or re-introduce (whichever the case may have been), the new request forms. We also took the time to explain the benefits of the new form and answer any questions they might have had (all of this was done ad-hoc and in a non adversarial manner). The new forms and policy were received well and by the end of the month the organization had entirely switched to the new forms.

The Third Phase

The last phase of the deployment was the implementation of the new purchasing policy and the internal purchasing procedures. Since the organization had been previously made aware of the upcoming changes on numerous occasions and via numerous vehicles the actual transition was anti-climactic. It had been expected for some time, and it finally occurred. From a project management standpoint, this was a good thing. It meant that we had adequately prepared the organization for the change and it was readily accepted. The new policy worked, and continues to work, well. There have been little or no associated problems with the policy. On the other hand, as discussed earlier, the internal procedures of the purchasing department have continued to be inconsistent at best. This has had an impact on the "customer satisfaction" piece of the pie and will be discussed further in the next sections.

Advantages of the New System

The advantages of the system are many. As you may recall, there were two goals for the project; increase the availability of useful information, and improve the structure and administrative control of the purchase order process. To a major extent, we have attained these goals. The attainment of these goals will be presented and discussed from both an objective and subjective perspective. Some aspects, which are more appropriately addressed from the subjective perspective, will be presented in the evaluation section. The other aspects, that are more appropriately addressed from the objective perspective, will be presented in this section.

These aspects deal specifically with the attainment of the first goal; increasing the availability of useful information. As mentioned in the introduction, there was little or no useful information available from the old system. It was very antiquated. The new system, on the other hand, has many advantages over the old system and has already provided a wealth of information in its short existence. This section will present some of the more important advantages that the application has to offer. These advantages are clear-cut without objection (hence its objective presentation).

The new system offers the added security of being a computer-based application that is password protected and restricted from general network access. This is advantageous because this, and only this, system can create the purchase orders for the organization (Appendix-H1). These new PO's differ significantly from the old ones (there should be no confusion in the accounting department or from the vendors). This is

beneficial from both an administrative and fiscal perspective because it offers reduced general access, secured authorized access, and clearly differentiated forms.

The next advantage comes in the form of useful information. In this comparison, there is no comparison. The old system offered nothing similar, more appropriately, nothing at all. This system, since it is tightly integrated with a database, offers a wealth of information that is available in report, queries, and graphical formats (see table-2). This information, which is easily accessible through the application's point-and-click interface, is also broken down by cost center, month and fiscal year. The database can store the information for three years and also allows exportation of the data into a myriad of other applications. These features combined create a system that is clearly superior to its predecessor when it comes to the amount of available and useful information.

SMARRT Reports and Output	
Order Detail List Report	Appendix-H2
Order List Report	Appendix-H3
Cost Center Usage Report	Appendix-H4
Ship-To Usage Report	Appendix-H5
Order List by Cost Center (exported and reformatted)	Appendix-H6
Purchase Order Tracking (query module)	Integrated Module
Item Usage (query module and report)	Integrated Module
Top n Item Usage (by volume/\$) (query module and report)	Integrated Module
Cost Center Analysis Graphs (graphing module)	Appendix-H7
Ship-To Analysis Graphs (graphing module)	Appendix-H8
Purchase Orders by Cost Center Pie Charts (exported)	Appendix-H9

table-2

The Eighth Objective - Evaluate the New System

To determine the evaluation of the implementation of the new system, open ended interviews were conducted and the responses were studied with a technique called content analysis. The application of this technique was identical to the procedures discussed earlier. This was done to allow for comparisons of the pre and post interviews and a determination of the implementation's success or failure.

Appendix-I presents, in a little more detailed format than the previous version, a coding and tally sheet that measured the number of times an issue was addressed during the pre and post-implementation interviews. This sheet is organized by question and color coded. The questions and the categories are broken down into color coded positive (green) and negative (red) statements. The actual statements given during the interviews were usually different, but they all revolved around a few select themes. Categories were developed with these "themes" and the statements were re-coded for frequency again.

In general, the post-implementation opinion of the process was favorable. There were 18 statements made that would generally be considered unfavorable or negative and 34 statements that would be considered favorable or positive. This is significantly different from the statements obtained in the pre-implementation interviews (which were generally unfavorable). The relative frequency of these statements is displayed as a pie chart, with a 65 percent positive statement rate. This compares very favorably to the pie chart that represents the pre-implementation opinion of the process.

Not only does the post-implementation pie chart represent a positive opinion of the new process, more importantly, it demonstrates a dramatic shift in opinion from the subjects. This is viewed as a clear indication that the implementation process, by and large, was successful. More careful examination of the coding and tally sheet reveals another aspect of this point that warrants further discussion. This aspect deals with the category coding process for the post-implementation interviews. During this process, new categories had to be created. These categories were not present for the first series of interviews and were based on the "themes" that evolved in the second set of interviews.

The first category, "the purchase order process is better than it was," and the second category, "the new capabilities and information, not previously available, is a strength of the system" are important. They are so, not only because they are the respective modes for each question, but because they represent a recurring positive issue that was absent from the first interviews. The following direct quotations, from the second interviews and these respective categories, will add further to this line of thought and illustrate some of the opinions of the implementation. The first quotation, "It's easier to get stuff than it used to be" was made by subject JR. In its context, the subject was referring to her ability to obtain items through the new procedures. The implication was that the new procedures have made this task easier. The second quote, "I personally have benefited from the implementation, the better procedures have made my job easier", was made by subject JE when she was referring to her ability to quickly obtain purchase order numbers (her job productivity and effectiveness was increased with this new ability).

The third quotation, "We now know what's going on, there's no more guessing", was made by subject LD, and was one of the statements that was coded for the second category (identified earlier). In its context, the subject was referring to her ability to follow the purchase order process. The new information, that before was not available, now allows concurrent monitoring and tracking of purchase orders. This capability is essential to the operation of the purchasing department and is more evidence of perceived improvements and the shift in opinions. The last quotation, "We have a lot more options now," was also made by subject LD, and was referring to the new reporting capabilities. These capabilities, which were nonexistent before, are now convenient, simple to access, and very beneficial to the organization.

Continuing with the questions (on the coding and tally sheet) that addressed knowledge of the process (Q5-Q8), it was hoped that there would be a demonstrable difference in the pre and post interview responses. Although, this was not the case, there were some differences that warrant discussion. First, the difference in the knowledge of the approval process was noticeable. This should be attributed to the success of the signature authority policy implementation. Anecdotal evidence suggests that this implementation went particularly well. Secondly, the average time for receipt of ordered items dropped from 8.75 days to 6.4 days. This may be attributed to the new departmental procedures and performance goals, or it may not. Direct observations suggest influences attributed to the Hawthorne effect may have played a role in this reduction. A combination of these two elements is more likely responsible for this reduction in receipt time.

CONCLUSIONS

This project has accomplished many things, they are loosely grouped into two categories. The first group of benefits centers around information. This project has dramatically increased the amount of useful information. As the SMARRT database continues to be filled, the information it stores will be used for historical analysis, trend analysis and determination of seasonal patterns/cycles. This information has, and will continue to be used to track cost center usage, high cost items, and high volume items. This in turn, will enable aggressive contract re-negotiations and solicitation with other vendors for prime vendor status and significant cost savings. All of these features are new, and were not possible with the old system.

The second group of benefits centers around control. The old process suffered from a general lack of control and this project, for the most part, has alleviated this problem. There have been many initiatives developed and implemented. First and foremost, the development and introduction of detailed policy guidelines has clarified and streamlined the purchase order process. Further, the new policies, and their methods of introduction, have increased the general understanding of the processes involved and reduced the level of associated problems. This new efficiency, and the previously mentioned wealth of information has been the result of the implementation of a purchase order tracking system that is clearly superior to its predecessor. This has been done to the benefit and satisfaction of the manager, the customers of the process, and to the organization.

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